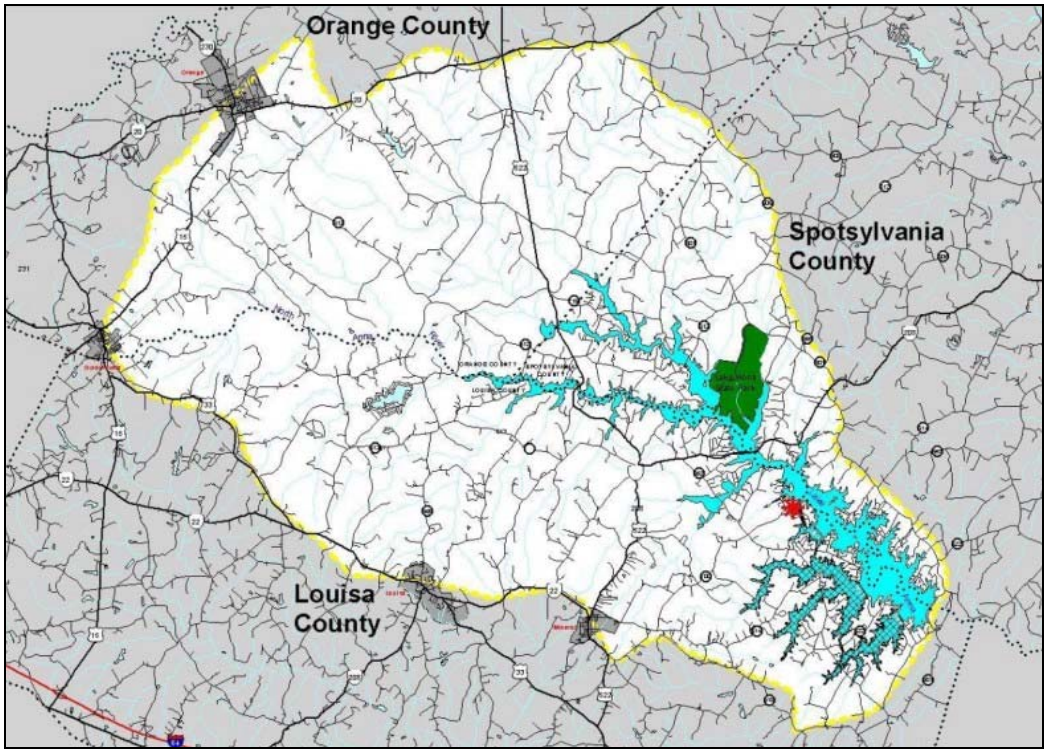
# LAKE ANNA WATERSHED LAND USE PLAN

## May 2004




**Prepared by**
**The Lake Anna Watershed Roundtable**

DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES

Chesapeake Bay Program
*A Watershed Partnership*

National Fish and Wildlife Foundation

This Land Use Plan was made possible by
The Lake Anna Civic Association and funding from
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And participation by the Roundtable stakeholders:

- Virginia Commonwealth Natural Resource Departments of
  - Conservation and Recreation
  - Environmental Quality
  - Forestry
  - Game and Inland Fisheries
  - Mines. Minerals and Energy
- Rappahannock Area Development Commision
- Rappahannock-Rapidan Regional Commission
- Thomas Jefferson Planning District Commission
- Culpeper Soil and Water Conservation District
- Thomas Jefferson Soil and Water Conservation District
- Tri-County/City Soil and Water Conservation District
- Louisa County Planning Department
- Orange County Planning Department
- Spotsylvania County Planning Department
- Lake Anna Advisory Committee
- Virginia Cooperative Extension
- Virginia Farm Bureau
- Lake Anna Economic Development & Tourism Partnership
- Lake Anna Civic Association
- Lake Anna Watershed Academic Advisory Council:
  - Mary Washington College: Professors Michael Bass, Jodie Hayob, Debra Hydorn, Neil Tibert, Chuck Whipkey, and Grant Woodwell
  - Randolph Macon College: Professor Charles Gowan

Contact Carl Groth at grothhome@adelphia.net with questions or comments

# EXECUTIVE SUMMARY

Four years have passed since the Lake Anna Special Area Plan (LASAP) presented a comprehensive watershed management plan to the Boards of Supervisors for Louisa, Orange, and Spotsylvania counties. Spotsylvania County integrated the LASAP into its Comprehensive Plan, while Louisa and Orange counties considered the LASAP to be advisory only. The scorecard evaluation of county ordinances prepared for this Land Use Plan reflected this fundamental difference in attention to LASAP recommendations. This Land Use Plan proposes actions to help the three counties harmonize their ordinances and land use policies to more effectively protect natural resources and control growth and development.

Despite different attitudes by different county managers toward the LASAP in 2000, recent responses to the survey of watershed resident opinions about watershed issues that is reported in this Land Use Plan indicate that there is broad agreement on many of the LASAP's major recommendations. Protect water quality, restrict population growth, and retain rural character of watershed are some of the dominant opinions.

All three of these goals can be attained by conserving farms and forests. The survey indicates that land conservation is a preferred means of keeping farms and forests in their present use by offering land owners tax incentives, purchasing their development rights or purchasing their property outright. Conserving farms and forests can not only retain the rural character of the area, but also keep local property taxes lower in the future for all residents.

Each county has its own unique history, land and economy which can establish different contexts for public decision making about common issues. Nevertheless, the watershed's three counties share the extraordinary natural resource asset of Lake Anna, whose value will increasingly affect the welfare of all county residents – not just those of the watershed itself. For example, over one-third of Spotsylvania County's tax revenues now come from Lake Anna watershed residents and their economic activities. This significant share of county revenues resonating from the Lake Anna watershed comes from only 17 percent of the county area and less than ten percent of its residents. It is in each county's interest to conserve its portion of this common treasure.

Population growth is increasing at twice the rate desired by watershed residents, yet only Spotsylvania County has instituted policies to limit that growth and its impacts on community welfare. Recently elected supervisors of Louisa and Orange counties have taken steps to back away from controlling growth, and to not restrict free exercise of personal property rights. Yet it is the recognized tendency of uncontrolled growth and development to create environmental damage and reduce community welfare. There is a need for balance between controls and unhindered growth and development. Spotsylvania County is maintaining that balance well. Louisa and Orange counties are not.

Little progress has been made in implementing land use best practices. Spotsylvania County continues to score the highest (70) on the ordinance scorecard used by the

LASAP, and continued with this Land Use Plan. Louisa and Orange counties still do not measure up to state standards.

Water quality is the single most important attribute of the watershed's environment, according to the LASAP, and according to responses to the opinion survey. Yet six of the watershed's streams are impaired with bacteria, two with acid runoff from abandoned mines, and several areas of Lake Anna contain fish impaired with PCBs. Increasing water quality monitoring, and assessment and remediation activities by a number of federal, state and local community organizations need active, centralized coordination and management. We think that the Lake Anna Advisory Committee (LAAC) should assume that management role, in cooperation with the state and county governments.

This Land Use Plan recommends, among other things, that:

- The Lake Anna Advisory Committee (LAAC) affirm its commitment to accomplishing the LASAP's recommendations, and undertake management initiatives aimed at actively coordinating tightened controls on watershed growth, development and environmental hazards

- The watershed's three soil and water conservation districts (SWCDs) become active partners with their county governments in planning, communicating and enforcing best land use management practices; and as a conduit to the agricultural community for promoting land conservation.

- The watershed's three planning district commissions (PDCs) each become a planning guide for a share of the development issues facing the watershed's counties and communities.

- The watershed's three counties consult with the LAAC, SWCDs, and PDCs on initiatives aimed to harmonize their land use and environmental policies and practices in line with best management practices.

- The Virginia Farm Bureau prepare a land conservation plan, in cooperation with the countis, aimed at retaining the rural character of the watershed.

- The Lake Anna Watershed Roundtable continue to act as a sounding board and vehicle for discussion of watershed issues, in close cooperation with the LAAC. The Roundtable's Academic Advisory Council should continue to bring the best that science has to offer in the service of the watershed community.

- The Lake Anna Civic Association continue to provide leadership, guidance and funding assistance to appropriate watershed activities; and maintain its leadership and management of water quality monitoring and land use analysis.

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# A LAKE ANNA WATERSHED LAND USE PLAN

## *PURPOSE*

The Lake Anna Watershed Roundtable agreed in April, 2003 that:

- The Lake Anna Special Area Plan (LASAP) recommendations are still valid
- The LASAP is now over three years old. The further we get from the initial plan the less impact it has on current activities.
- The time is right to review progress made against the objectives established by the LASAP
- The three Counties, and Soil & Water Conservation Districts are each in different places relative to the implementation of LASAP recommendations. It is appropriate to review each separately.
- The long range goal for the watershed is to move closer to the vision established in the LASAP and have all jurisdictions within the watershed embracing a harmonized approach to watershed management

It was also agreed that the goal of the Roundtable in the near to mid-term is to develop a plan with logical steps that allow us to make progress toward completion over the next three years.

Funding[1] obtained by the Lake Anna Civic Association (LACA) to support these goals enabled the Roundtable to move forward over the past year in developing the fundamental research needed for preparation of this Land Use Plan. This Plan is focused on recommending updates to the LASAP's principal recommendations dealing with the need to harmonize and coordinate land use and environmental protection policies and ordinances. The recommendations of this Land Use Plan are offered to county and local community leaders in the hope that they can be used to draw the watershed community and its environment together in maintaining the rural character of the watershed.

## *BACKGROUND*

Environmental issues, particularly those dealing with water quality and the land uses that affect water quality are most effectively managed in a watershed context. Louisa, Orange, and Spotsylvania counties joined in preparing a watershed management plan, called the Lake Anna Special Area Plan (LASAP), by March, 2000. This Plan recommended

[1] Initial funding from January 2003 through May 2004 was provided by the Virginia Commonwealth's Department of Conservation and Recreation in cooperation with the Chesapeake Bay Program. Subsequent funding from December 2003 through November 2004 is being provided by the National Fish and Wildlife Foundation.

priority actions to protect water quality and adopt comprehensive planning by the counties.

The LASAP is the result of a unique planning effort undertaken by the Boards of Supervisors of Louisa, Orange, and Spotsylvania Counties at the request of the Lake Anna Advisory Committee (LAAC). LAAC, created in 1994 by the three localities under the Joint Exercise of Powers provisions in the *Code of Virginia,* has been advising the three counties about Lake-related issues since the committee's inception.

**LAAC**

Louisa, Orange and Spotsylvania counties agreed in 1994 to the establishment of LAAC as a mechanism for joint management of watershed issues. The following extracts of the agreement, as extracted from Louisa County code of ordinances.

"The Counties of Louisa, Spotsylvania and Orange (hereinafter referred to as the counties) hereby agree to establish a joint administrative organization under the provisions of Code of Virginia, § 15.1-21, to address matters of joint interest pertaining to Lake Anna and the adjacent shorelands governed by these counties

* * * *

The LAAC is a special entity of the counties bordering Lake Anna. The LAAC shall be organized for the stated purposes set forth below or added later by amendments to this agreement

- To promote cooperation and coordination among the local governing bodies and Virginia Power on issues concerning Lake Anna;
- To develop recommendations for new or revised ordinances/legislation specifically addressing the needs, issues, and/or problems involving Lake Anna, its shoreline, its shoreland area behind the lake, and the watersheds of Lake Anna as designated by the local governments;
- To promote planning and management for land, water and other natural resources and environmental quality maintenance;
- To administrate the on-lake marker program (i.e., no wake).
- To promote research, control and/or eradication of undesirable aquatic weeds in Lake Anna and to improve the quality of the water and to control pollution in and around Lake Anna; and
- To meet and discuss all local, state and federal agencies concerned with quality of human life, water, pollution, recreation, wildlife, fish and fishing conditions, in and around Lake Anna, and to pass on to all governmental agencies on the local, state or federal level any recommendations believed feasible and necessary to accomplish the purposes of this advisory committee.

The central assumption of this agreement is that the areas of Lake Anna (including the principal shoreland areas) in Louisa, Orange and Spotsylvania counties are to be considered for policy guidance jointly, not independently; thus this agreement and the

fulfillment of its purposes should survive and depend on the participation of all three counties and Virginia Power.

* * *

**Lake Anna Advisory Committee to operate with a plan and with clear objectives/management elements of a plan and deal with immediate and long-term concerns.**

The Lake Anna Advisory Committee shall at a minimum operate with an agenda of objectives to address. The initial agenda of objectives or program elements shall be set by the member governing bodies. Committee recommendations and proposals may be implemented in each jurisdiction as appropriate to local policies and ordinances of the jurisdiction" [end of extracts]

**LASAP**

In the spring of 1998 the Boards of Supervisors of Louisa, Orange, and Spotsylvania agreed to support the development of an inter-jurisdictional, comprehensive plan for the Lake Anna watershed. Each locality appointed individuals to serve on the Lake Anna Special Area Plan Committee. Including a Virginia Power representative the committee totaled thirteen. The group worked for nearly two years supported by the local planning staffs and the three planning districts that serve the localities.

The primary issue addressed in the Plan was the quality of water in the Lake and its tributaries. A consistent regional approach was recommended for local action to preserve and protect Lake Anna's water quality. This approach recognized the regional nature of the watershed and the local authority for implementing the recommendations. The recognition of Lake Anna as a regionally shared asset served to undergird the plan.

**Lake Anna Watershed Roundtable:**

The Lake Anna Watershed Roundtable was created by Lake Anna Civic Association leadership and funding in February, 2003 to undertake the task of updating the LASAP and preparing recommendations to county governments and other watershed stakeholders. The Watershed Roundtable is a cooperative coalition of the following watershed stakeholders:

| | |
|---|---|
| Commonwealth Department of Conservation and Recreation | Louisa County Planning Department |
| Commonwealth Department of Environmental Quality | Orange County Planning Department |

| | |
|---|---|
| Commonwealth Department of Game and Inland Fisheries, Fredericksburg Office | Rappahannock Area Development Council (RADCO) |
| Commonwealth Department of Mines, Minerals and Energy | Rappahannock-Rapidan Regional Commission (RRRC) |
| Culpeper Soil and Water Conservation District | Thomas Jefferson Planning District Commission TJPDC) |
| Friends of the Lake Anna State Park | Thomas Jefferson Soil and Water Conservation District |
| Lake Anna Advisory Committee (LAAC) | Tri-County/City Soil and Water Conservation District |
| Lake Anna Civic Association (LACA) | Virginia Cooperative Extension |
| Lake Anna Economic Development and Tourism Partnership | Virginia Farm Bureau |
| Lake Anna State Park | |

This Land Use Plan relied upon three research activities: a Watershed Survey, a comparison of ordinances and policies across the three watershed counties, and analysis of actual land use patterns across the watershed. The Watershed Survey Report is attached as Enclosure 1. The cross-county comparison of ordinances and policies is attached as Enclosure 2. Analysis of land use patterns is beginning with the development of a land use database by the Rappahannock Area Development Commission. This database requires contributions of land use data from each of the watershed's three counties, and will continue for several years since the counties' data are at significantly different stages of development.

## *FINDINGS AND CONCLUSIONS*

### *The Watershed Survey*

| Finding | Reference to Report (Encl 1) | Conclusion |
|---|---|---|
| 1. Watershed responses overall agree that a population growth rate of 2% is about right | p. 21, Fig. 6 | 1. There is not only broad agreement among watershed residents to limit population growth to 2%, but there is the potential to do so given land owners' intentions to largely keep land in current use, and more particularly farmers' desires for land conservation incentives.<br><br>This appears to be an opportunity for the counties and local community groups to undertake comprehensive land conservation activities with willing farmers and to jointly establish controls to guide development so as to maintain a 2% population growth rate.[2] |
| 2. A majority of Ag/Forestal land owner responses indicate the current population growth rate is too fast | pp. 21-22, Fig. 7 | |
| 3. Watershed responses overall agree with maintaining the rural character of the watershed, meaning over 50% farms and forests, or helping conserve land with conservation incentives. | pp. 22-25, Fig. 8-10 | |
| 4. Farmer responses prefer incentives for land conservation as a mechanism for maintaining rural character of the watershed | pp. 23 & 25, Fig. 11 | |
| 5. The vast majority of watershed respondents plan to keep their property in current use over the next 10 years | p. 25, Fig. 12 | |
| 6. Over 2/3 of overall watershed respondents agree with using controls to guide the pace of development. Just over 60% of farmer responses, and just under 80% of non-ag property owner responses agree. | p.27, Fig. 15 | 2. The types of controls for guiding the pace of development need to be tuned to the particular land owners and their county. Different counties may need different controls to achieve a mutually agreeable overall pace of development for the watershed.<br><br>Newly elected (in fall of 2003) Louisa County supervisors, for example, reversed the direction that the earlier Planning Commission and Planning Department had been going to tighten controls in order to slow growth by limiting the fragmentation of land parcels for development. A newly |
| 7. Almost 25% of Orange County respondents disagreed with using controls to guide development, compared to only about 16% of Louisa and Spotsylvania county respondents. | p. 27, Fig 15 | |
| 8. Louisa and Spotsylvania county respondents want to encourage retail and professional service commercial activities, whereas Orange County respondents prefer light industry and professional services to retail. | p. 26, Fig 13 | |

[2] This conclusion is qualified to the extent that a significant number of land parcels have already been platted for development, and are therefore a potential source of future developments that cannot be restricted.

| Finding | Reference to Report (Encl 1) | Conclusion |
|---|---|---|
| 9. The majority of Louisa and Spotsylvania county respondents agree that counties should regulate the use of campers, travel trailers and tents in the watershed. Less than 50% of Orange County respondents feel that way. | p. 26, Fig. 14 | elected BOS for Spotsylvania County, on the other hand, affirmed a slow growth policy limiting parcel fragmentation. Orange County supervisors refused to approve their Planning Director and Planning Commission's attempt to tighten development controls along the growth corridor of Routes 20/15.[from news articles in the Central Virginian for Louisa County, and Free Lance-Star for Spotsylvania and Orange counties] |
| 10. Water quality is clearly the dominant environmental issue in the watershed, receiving 3 times the 1st place "votes" as the second issue: water supply. | p. 29, Fig. 17 | 3. Water quality is the dominant environmental issue in the Lake Anna watershed. However, there is uncertainty about options to help control water quality, particularly with respect to potential bacteria impairment and stormwater runoff. It appears that information programs are needed to inform residents about water quality control options. |
| 11. Over 90% of respondents felt that bacteria impairments were a serious problem, however, they were fairly evenly divided among potential bacteria control options. | pp. 29-31, Figures 18-19 | |
| 12. Respondents were split between agreeing and disagreeing with the proposition that alternative waste treatment systems (alternatives to individual septic systems) should be allowed. | pp. 29-30, Fig. 18 | |
| 13. Respondents from Louisa and Spotsylvania counties were evenly divided about requiring sanitary facilities at common areas and marinas, but almost 70% of Orange County respondents felt that such facilities should be required. Less than 40% of lake-side dweller respondents wanted such requirements compared to over 60% for other watershed respondents. | pp. 31-32, Figs. 20-21 | |
| 14. Respondents felt that complying with Chesapeake Bay Act standards was the most preferred way to control stormwater runoff, which is a major source of erosion and other forms of water quality impairment. | p. 32-33, Figs. 22-23 | |
| 15. Although almost 90% of responses to the topic of controlling soil erosion believed that soil erosion was a serious threat, responses were evenly divided between the two control options offered. | pp. 32-34, Fig. 24 | |
| 16. The majority of residents felt that groundwater regulation is needed, although perception of the problem of groundwater quality and quantity increases with residents' distance from Lake Anna. | pp. 34-35, Fig. 25 | |

| Finding | Reference to Report (Encl 1) | Conclusion |
|---|---|---|
| 17. Responses from those living closest to Lake Anna agreed that Routes 208 and 522 should have priority for improvements, while responses furthest from the lake (most in Orange County) want to focus improvements on Routes 522, 15, and 20. | pp. 36-37, Figure 26 | 4. A narrow majority of responses supported creation of a Special Overlay District comprising the watershed. A substantial minority, however, "did not know," and over one-third of ag responses disagreed.<br><br>This priority recommendation of the LASAP offers a mechanism for implementing policies and ordinances designed specifically for the Lake Anna Watershed. The significant level of uncertainty about the proposal, however, indicates the need for more information about its costs and benefits.<br><br>Concentration of commercial activity in "village centers" received somewhat greater support, but still leaving at least one-fourth of the respondents "neutral."<br><br>These priority recommendations of the LASAP need greater visibility, public discussion, and then resolution by the three counties.<br><br>Maintaining the rural character of the watershed continues to receive global support, but is linked to land use controls among the three counties. |
| 18. The majority of Louisa and Spotsylvania responses agreed with the LASAP's first priority recommendation to create a Special Overlay District to facilitate uniform management of the watershed. Only about 45% of Orange County responses agreed, but another 45% said they "don't know." Over 50% of non-ag responses agreed, whereas less than 40% of ag responses agreed. | pp. 38-39, Figs 28-29 | |
| 19. A majority of each county's responses agreed with another priority LASAP recommendation to concentrate commercial development in "village centers." Only one-third of ag responses agreed with this recommendation, however. | pp. 39-, Fig 30 | |
| 20. Over 80 percent of all responses agreed with LASAP emphasis on maintaining the rural character of the watershed. This broad agreement correlated well with responses to question 12 which wanted the land to "remain the same." | pp 40-41, Figs 31-32, | |
| 21. Watershed responses were about evenly divided among choosing user fees, voluntary effort, and bond funding to support watershed management. Orange County responses appeared to have a greater preference for user fees and taxes than did responses from other counties. Louisa and Spotsylvania county responses slightly favored voluntary effort and bond funding. | p. 42, Fig 33 | |

***Comparison of County Ordinances***

A key portion of the analysis undertaken by the plan was to compare local codes and ordinances to accepted best management practice. This comparison serves as a benchmark to identify opportunities for amending code and ordinance to help preserve and enhance water quality. The initial analysis was done in a scorecard format with 68 points of evaluation in six different categories. The categories of code and ordinance evaluated included street & roads, parking, low impact, buffers, disturbance, and stormwater.

Detailed ordinance scorecards for the counties are at Enclosure 2

**Findings from LASAP – March, 2000**

The three counties all had some best management ordinance in place to help protect Lake water quality. Spotsylvania County scored the highest at 69 points with particularly strong scores on low impact design measures, buffer measures, and stormwater measures. Orange County was next with 50 points showing strong scores in low impact measures but significantly behind the other two counties in street and road measures. Louisa County scored 47 points with strength in street and road measures but well behind best practice in buffer measures, disturbance measures, and stormwater measures.

**General Findings – March, 2004**

A review of current code and ordinance indicates that relatively little progress has been in amending or adding best practice code and ordinance to any of the three localities. Louisa County showed the most progress adding three points to their score bringing their total to 50 points. Orange County did not report so this report assumes their score stayed at 50 points. Spotsylvania County moved forward one point to 70 points. Spotsylvania continues to receive high scores relative to buffer, disturbance, and stormwater measures. In these three areas alone Spotsylvania outscores Louisa by 16 points and Orange by 12 points.

**Table 2. County Ordinance Comparison Findings**

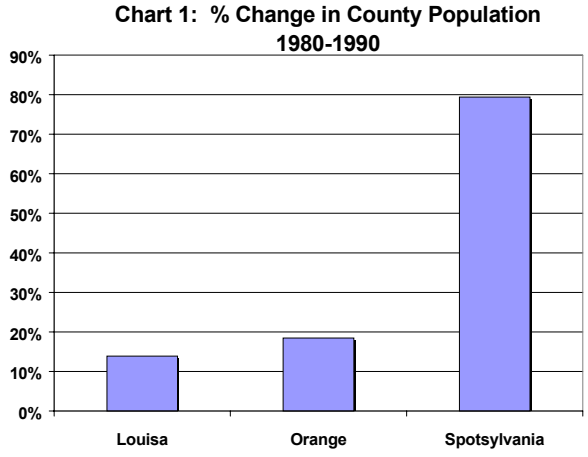
| Ordinance Measure | County | | |
|---|---|---|---|
| | Louisa | Orange | Spotsylvania |
| Street | Scored the highest of the three counties on this measure with 16 points<br><br>Opportunities to lower right-of-way requirement and include design criteria for swales<br><br>Could be used as the lead county in moving the watershed to best practice | Scored the lowest of the three counties on this measure with 6 points<br><br>Need to implement best practice design by adopting ordinance that minimizes impervious surface and encourages bio-retention | Opportunity to allow parking lanes to serve as traffic lanes to reduce impervious<br><br>Could allow utilities under paved ROW |
| Parking | All parking requirements are expressed as minimums rather than median<br><br>Opportunity to promote shared parking by reducing ratios and offering shared parking design models<br><br>Could reduce impervious surface by encouraging 30% of space for compact cars and establishing that a minimum percentage of parking lot be landscaped | All parking requirements are expressed as minimums rather than median<br><br>Opportunity to promote shared parking by reducing ratios and offering shared parking design models<br><br>Could reduce impervious service by encouraging 30% of space for compact cars and establishing that a minimum percentage of parking lot be landscaped | All parking requirements are expressed as minimums rather than median<br><br>Reduce parking ratio requirements if shared parking agreements are provided and offer a model for shared parking<br><br>Could reduce impervious service by encouraging 30% of space for compact cars |
| Low Impact | Opportunity to introduce a | Could adopt open space by- | Establish guidelines for |

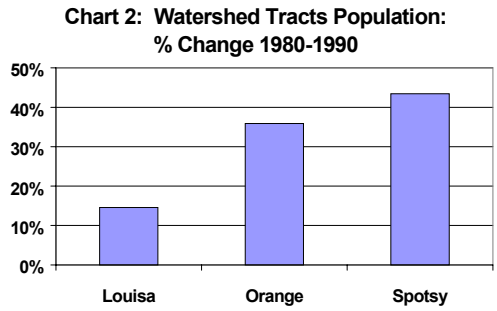
| Ordinance Measure | County | | |
|---|---|---|---|
| | Louisa | Orange | Spotsylvania |
| | comprehensive set of Low Impact Development ordinances with incentives for implementation | right ordinance and flexible site design criteria<br><br>Roof-top run-off and temporary ponding opportunities exist | percentage of open space to be managed in natural condition<br><br>Work to consolidate open space |
| Buffer | | Have basics for buffer management but need to add design criteria along with enforcement mechanism | Currently managing to best practice |
| Disturbance | Biggest opportunity area for Louisa County. Need to address buffer requirements for streams, tributaries, and lakes. | Need to adopt ordinance that protects trees and natural vegetation from disturbance<br><br>Should consider offering incentives for land conservation | Offer incentives for land conservation and flexibility to meet regulatory conservation restrictions |
| Stormwater | Efforts to establish stormwater best practice can be tied into the comprehensive effort to introduce Low Impact Development ordinance | Implement design criteria for stormwater BMP's<br><br>Prohibit direct discharge of stormwater into wetland | Currently managing to best practice and have implemented bio-retention option for handling stormwater |

***Review of Demographics, Water Quality Monitoring, and Land- Use Patterns***

**Demographics**

The Lake Anna Special Area Plan (LASAP) of 2000 compared population growth in the watershed's three counties, and in the watershed portions of those counties, from 1980 to 1990 as shown in Charts 1 and 2 below.



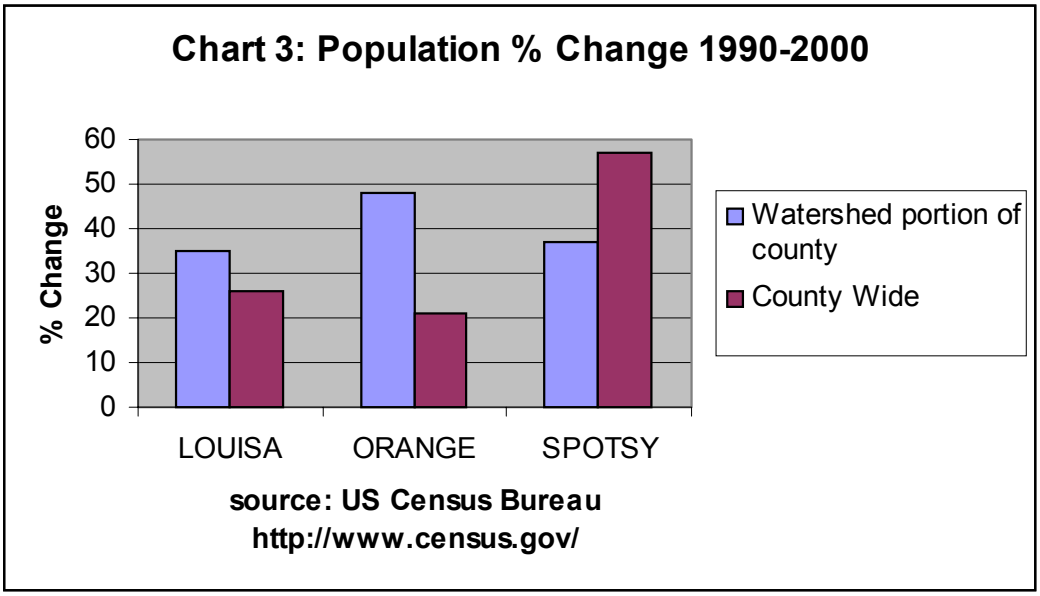

Source: Weldon Cooper Center

Population growth over the period 1990-2000 is shown below in Chart 3. Spotsylvania County continues to grow the fastest, although not at its 80 percent growth experienced in 1980-1990. Spotsylvania's countywide growth rate continues to exceed the growth rate of its portion of the Lake Anna watershed. Louisa and Orange county portions of the Lake Anna watershed displayed surging population growth rates between 1990 and 2000, compared to the 1980-1990 period. Louisa County's rate of growth just about doubled, both in terms of countywide and watershed portion. Orange's countywide population growth rate increased very slightly, but its watershed portion grew from a rate of about 36 percent between 1980 and 1990 to almost 50 percent between 1990 and 2000[3]. Orange's watershed portion contains the Routes 15 and 20 growth corridor between Gordonsville and to the east of the town of Orange.

Orange and Spotsylvania county watershed population grew at more than 2 percent per year for the 1980-1990 period, and indeed closer to double that rate. Louisa's watershed population grew at less than a 2 percent rate during that period. Louisa and Spotsylvania counties' watershed populations grew at just over 3 percent annually between 1990 and 2000, while Orange County's watershed population continued to grow at about 4 percent per year. Earlier estimates of a

[3] The selection of Census Bureau tract groups used to approximate watershed population and other data may have overstated Orange County's numbers because 2 of the four tract groups actually extended somewhat outside of the watershed. Orange County's watershed population growth rates reported here may therefore be somewhat higher than they actually are, although conclusions drawn from trends are correct.

watershed population growth rate of 2 percent therefore fall short of actual growth rates, which can lend greater urgency to controlling population growth in the watershed in the years ahead.




A graphic portrayal of housing unit and income distributions by census tracts across the watershed and surrounding areas is provided in Figure 1 and Figure 2, respectively, below. The Lake Anna watershed is approximately sketched in red.

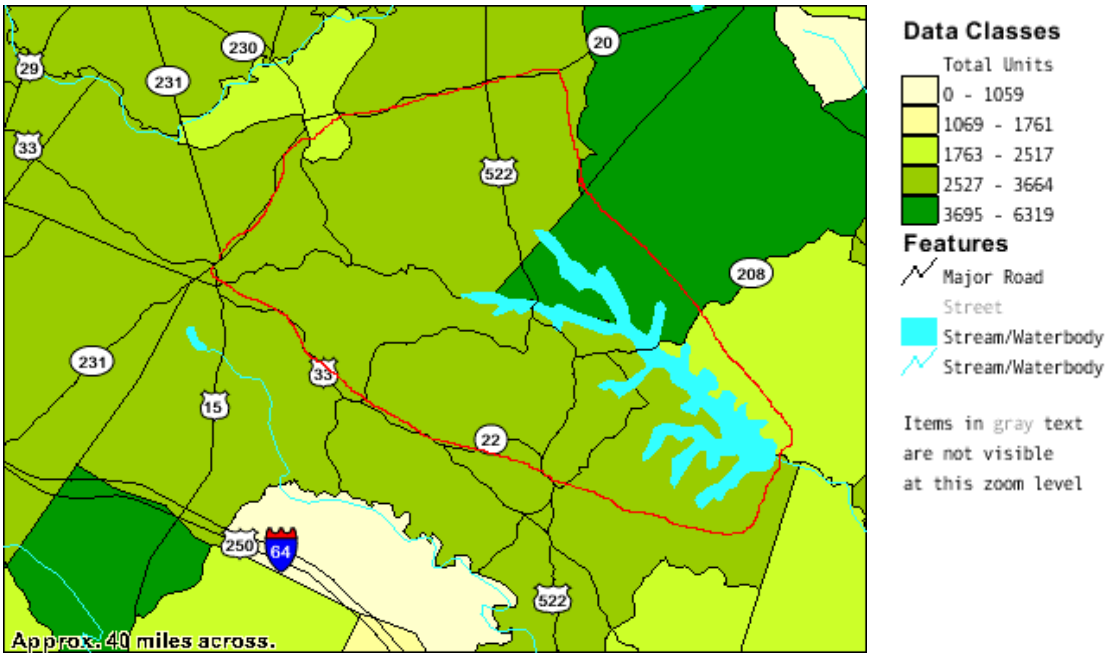



**Figure 1. Housing Unit Density (source: US Census Bureau 2000 data**

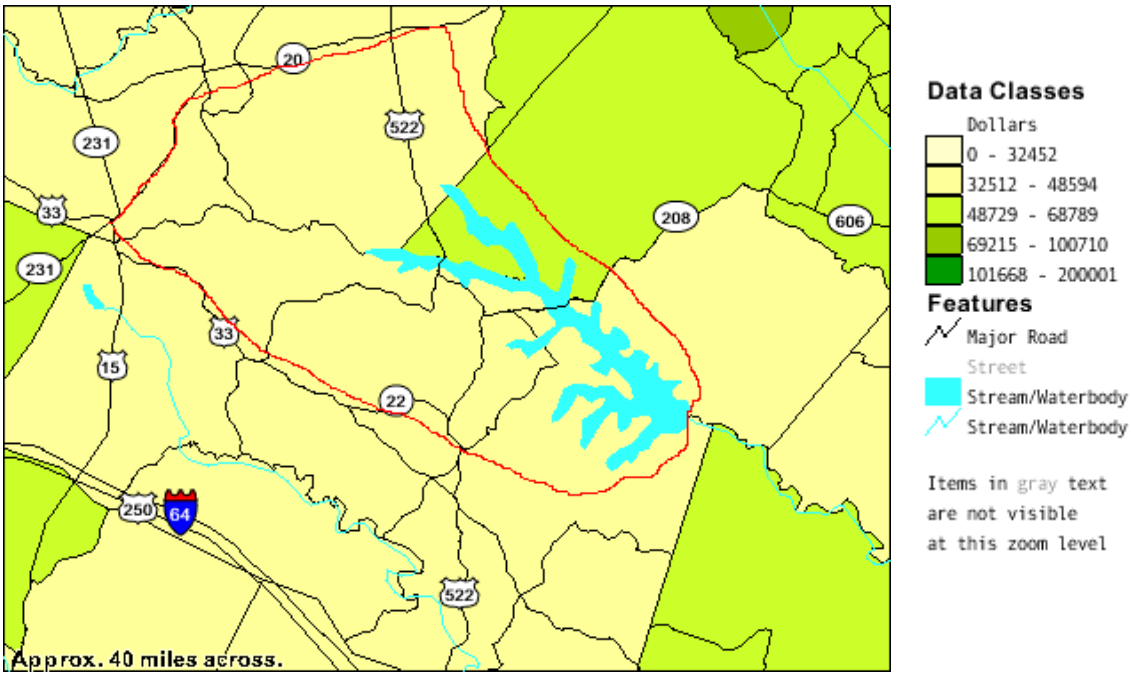



**Figure 2. Median Income Distribution (source: US Census Bureau 2000 data)**

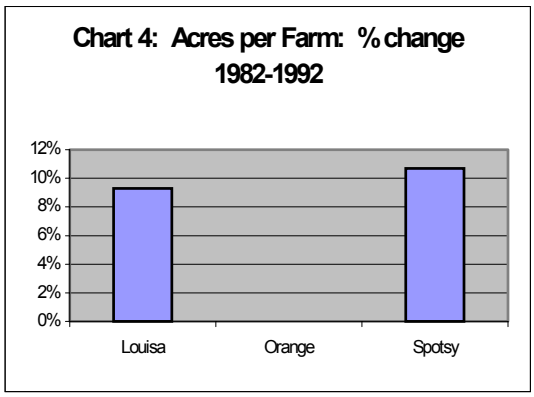
Figure 2 indicates that the Lake Anna watershed lies in a low income area surrounded by higher income areas in closer proximity to major population centers such as Richmond, Charlottesville and Fredericksburg. What Figure 2 does not show is the higher income and increasing property values immediately surrounding the lake. This increasingly valuable watershed is already subsidizing all counties' services outside of the watershed. Spotsylvania County officials report that residences valued over $300,000 provide more revenues to the county than their share of county services requires. Virtually all waterfront residences, and many residences in proximity to the lake are valued at well above $300,000.

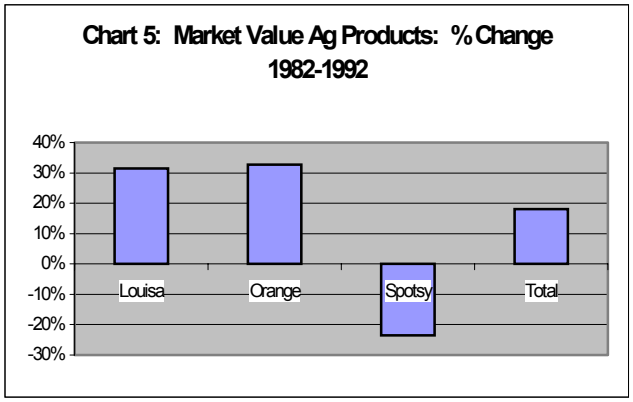
The result is that an increasing share of each county's revenues emanate from watershed residents and their property. Over one-third of Spotsylvania County's tax revenues now come from Lake Anna watershed residents and their economic activities. This significant share of county revenues resonating from the Lake Anna watershed comes from only 17 percent of the county area and less than ten percent of its residents.

**Land Use**

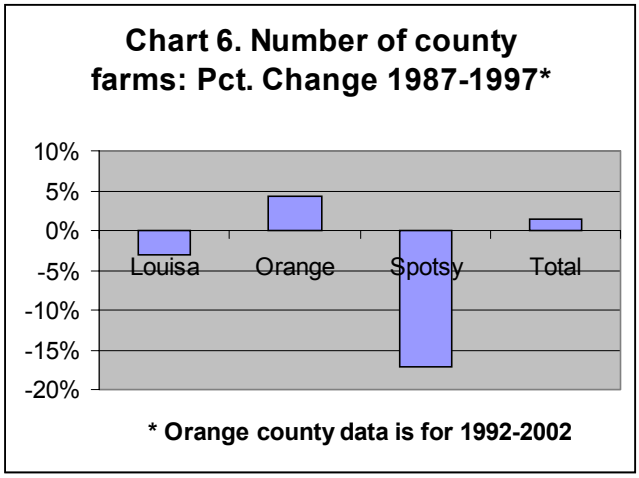
Current views of land use in the Lake Anna watershed will become available from a watershed land use database being prepared by the Rappahannock Area Development Commission (RADCO). RADCO is working with each county's planning department to obtain land use data for a GIS-based database which will facilitate watershed-wide consideration of land use policies and ordinances.

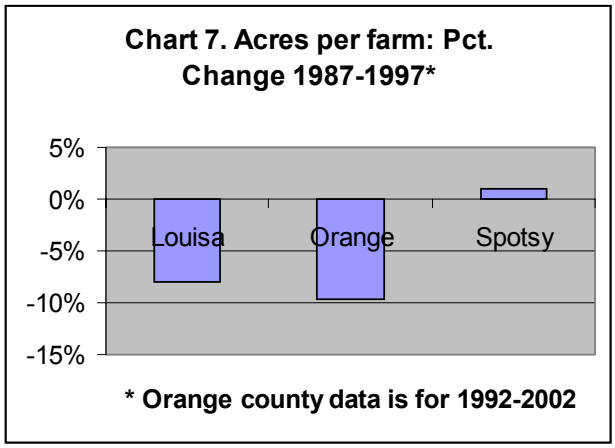
The LASAP provided charts of the status of agriculture in each of the three counties, and are reproduced below as Charts 4 and 5. There was no change in Orange County acres per farm from 1982 to 1992 (Chart 4).

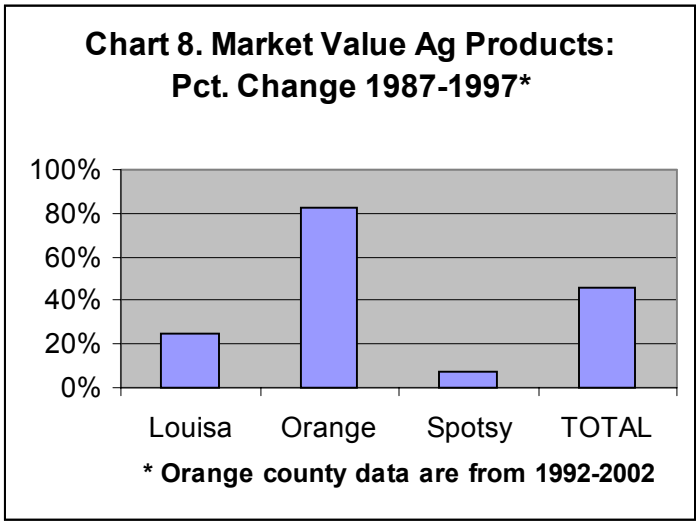



More current agriculture data for the counties are presented in Charts 6-8 below.

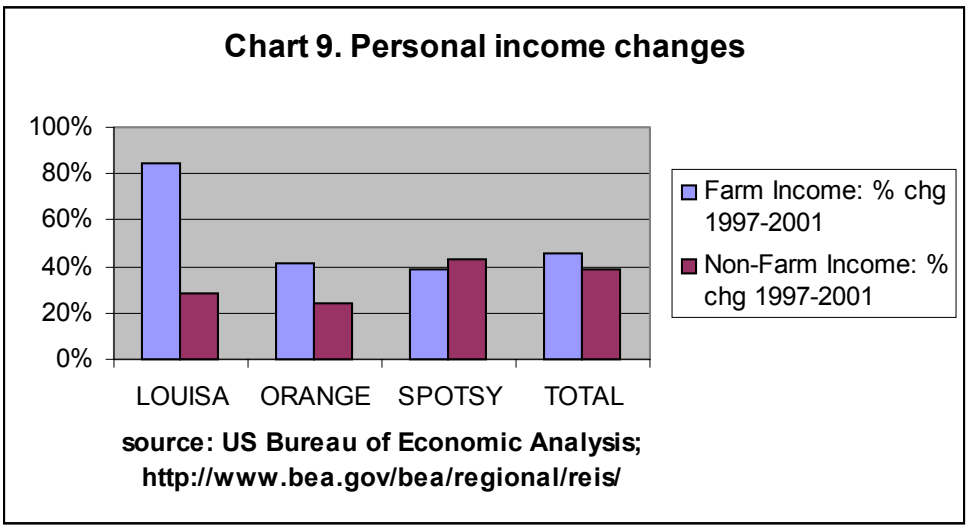


Orange County agriculture is growing in terms of value of product and number of farms, although average farm size is declining. Louisa and Spotsylvania counties, however, are experiencing very small increases in agriculture sales and continuing declines in the number of farms.

Personal incomes from agriculture and non-agriculture sources, for the five-year period ending in 2001, however, indicate that both agricultural and non-agricultural incomes in all counties continue to rise despite the decline of agriculture production in Louisa and the small increase in agricultural production in Spotsylvania. Chart 9 portrays these trends of personal income.




Until new data is obtained from RADCO's Land Use Database project, LASAP portrayals of land use characteristics can be used for analysis. For example, it is believed that the description of land cover shown in Figure 3 below (titled Map #4) still fairly represents the watershed's current land cover. In addition, Figures 4 and 5 are correct descriptions of the LASAP's portrayals of future land use, and soil constraints to septic operations, respectively.

RADCO's capabilities in supporting the watershed's GIS-based data and graphic needs make it a superb long-term partner with watershed planning and management organizations.

**Land Conservation**

Land conservation is one of the measures most often proposed to maintain agriculture and forest land use, and was recently supported by the opinion of watershed residents expressed in the watershed survey (Enclosure 1). Land conservation measures can range from technical assistance to help landowners use their land more effectively, to financial incentives for keeping farms and forests in use, to purchase of development rights or outright purchase of the land by the public.

The federal Farm and Ranch Land Protection Program (FRPP), for example, provides matching funds to help purchase development rights to keep productive farm and ranchland in agricultural uses. The US Department of Agriculture partners with State, tribal, or local governments and non-governmental organizations to acquire conservation easements or other interests in land from landowners. USDA provides up to 50 percent of the fair market easement value.

Our watershed counties are on a treadmill of searching for infrastructure (e.g., roads and schools) funding as new development increases the demand for infrastructure to serve increased population growth. Land conservation measures can be investments in lower future taxes and maintenance of rural character. Residential lands require almost four times the infrastructure services as farm and forest lands do.[4] Public funds for land conservation are limited, but more could be made available under innovative revenue programs. The question is how much communities will be willing to pay to retain their rural character.

Recent efforts to improve the Chesapeake Bay water quality and thereby its natural and human environmental welfare are highlighting the need for rapid attention to land conservation. Environmental experts believe that urban and development threats to water quality are more costly to protect against and remediate than agricultural threats to water quality. If that is so, then water quality costs will rise more rapidly as urbanization and development replace rural land. Watershed communities that maintain a balance between rural and urban lands will be making a wise investment in their future welfare.

[4] Virginia Agricultural Vitality Program, Virginia Conservation Network, Nov 2003

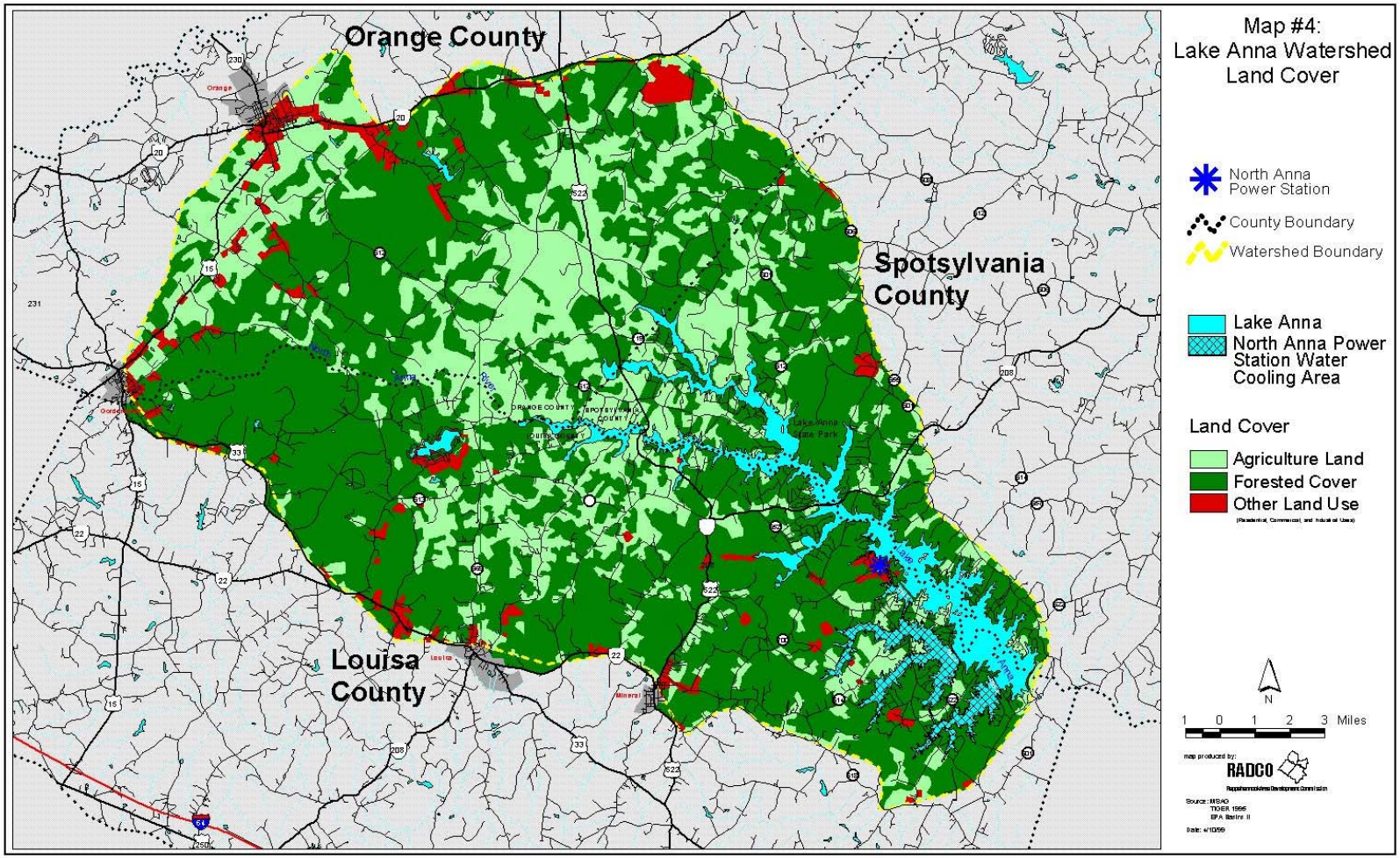



**Figure 3. Lake Anna Watershed Land Cover**

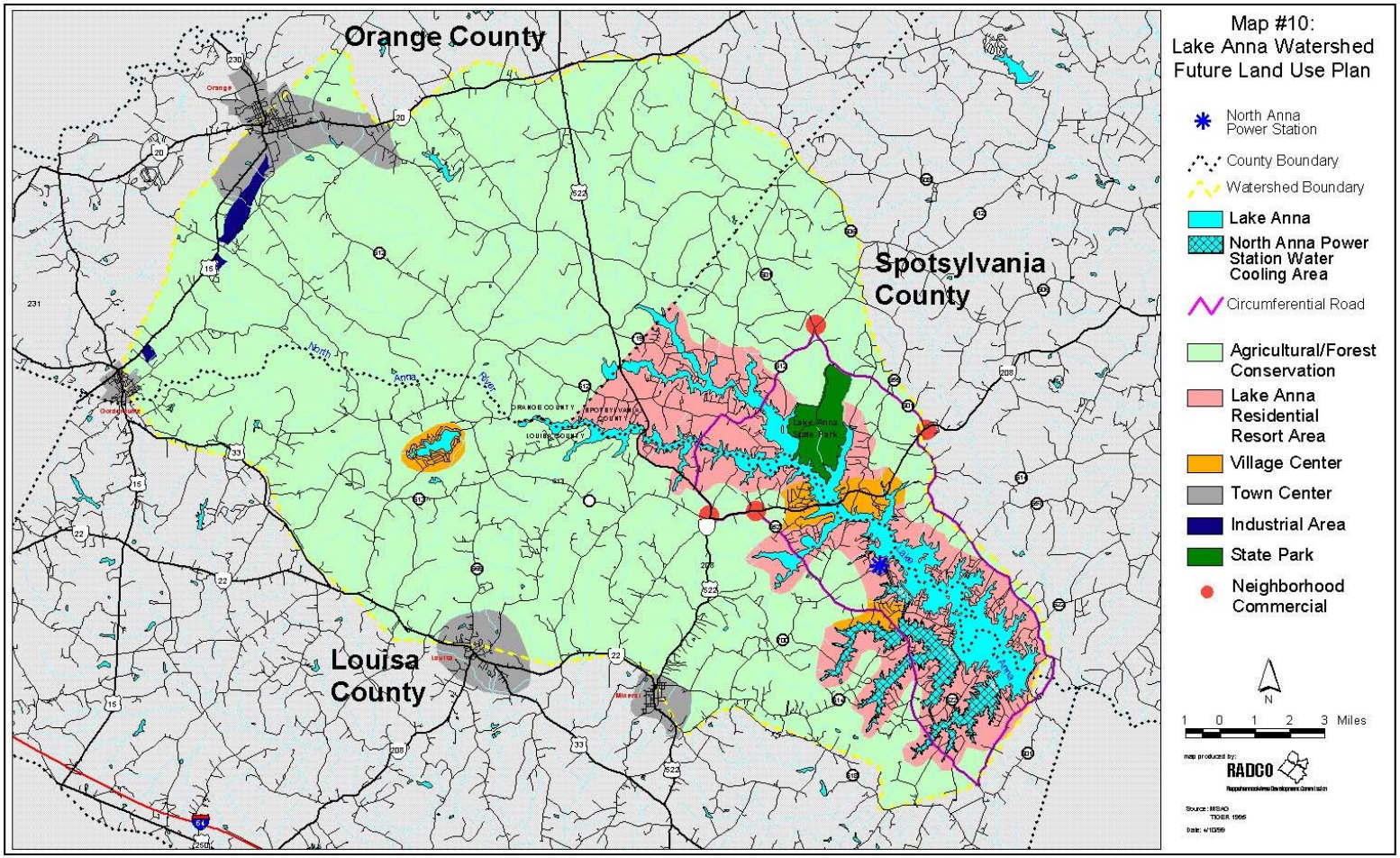



**Figure 4. Lake Anna Watershed Future Land Use Plan**

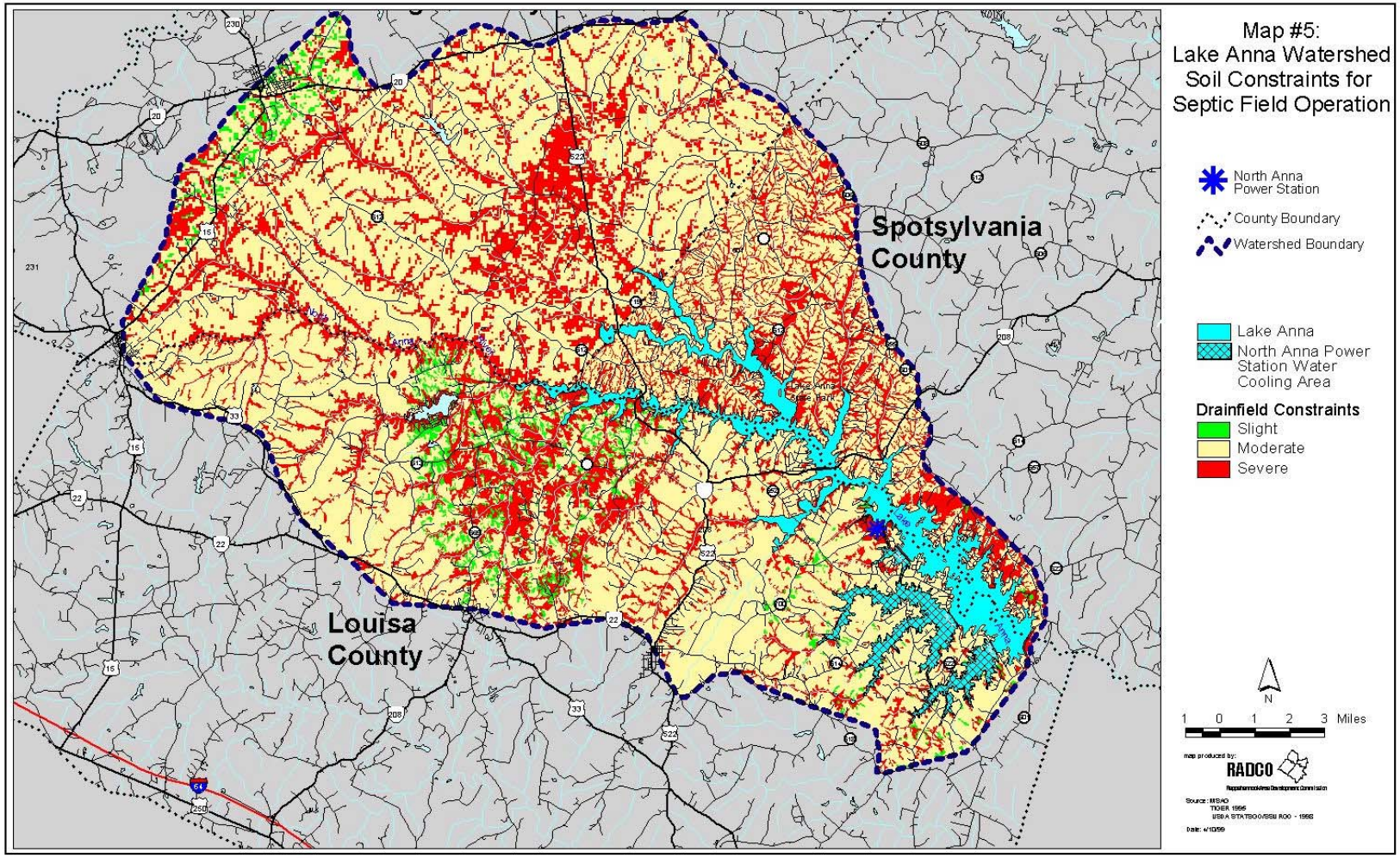



**Figure 5. Lake Anna Watershed Soil Constraints for Septic Operations**

**Water Quality Monitoring**

The LASAP highlighted the lack of adequate information about water quality in Lake Anna and its tributaries, and pointed to the need for a substantial improvement in monitoring and the community's picture of watershed water quality. Monitoring has expanded substantially since 2000, and the water quality picture has become much clearer. Improved monitoring has also identified potential sources of public health hazards which will require increasingly active management of watershed water quality and the public programs needed for its support.

The Lake Anna Civic Association (LACA) created a water quality program in 2000, with over 20 monitoring stations on the lake monitored by more than 40 volunteers. LACA's program was the first citizen program in Virginia to jointly monitor its waters with the Department of Environmental Quality (DEQ)under a Memorandum of Agreement signed in early 2003. Creation of a Watershed Academic Advisory Council in 2003 has led to a study of water quality in the watershed streams in the summer of 2004 by Randolph Macon College, using profiles of macroinvertebrates found in the stream bottoms to measure the streams' ability to support aquatic life. An appropriation for the U.S. Army Corps of Engineers in 2003-2004 is enabling DEQ, the Corps, and watershed participants to investigate the source of PCBs and metals detected in lake fish tissue. Finally, DEQ is beginning studies of the sources of bacterial impairment in six of the watershed's streams. These studies are called Total Maximum Daily Loads (TMDLs) and are required by state and federal environmental laws.

Louisa County, in cooperation with LACA and DEQ, has applied to the U.S. Environmental Protection Agency (EPA) for a grant to assess the environmental and economic threat of Contrary Creek's mine-scarred lands. Many abandoned mines in the Contrary Creek watershed have been contributing acidic outflows into the lake, harming boat finishes and the fish population in the creek and the Lake Anna arm of the creek. This substantial progress in monitoring activity has been made possible by LACA's success in attracting grants to pay for monitoring equipment, analyses, and supporting infrastructure. Louisa and Spotsylvania counties regularly provide annual grants for LACA's monitoring program, and substantial grants have been obtained from the Commonwealth's natural resource agencies, Dominion Virginia Power, Inc., the Lake Anna Advisory Committee (LAAC), The Chesapeake Bay Program, and the National Fish and Wildlife Foundation.

The extent of water quality monitoring in the watershed is indicated by the number and variety of monitoring sites shown in Figure 6 below.

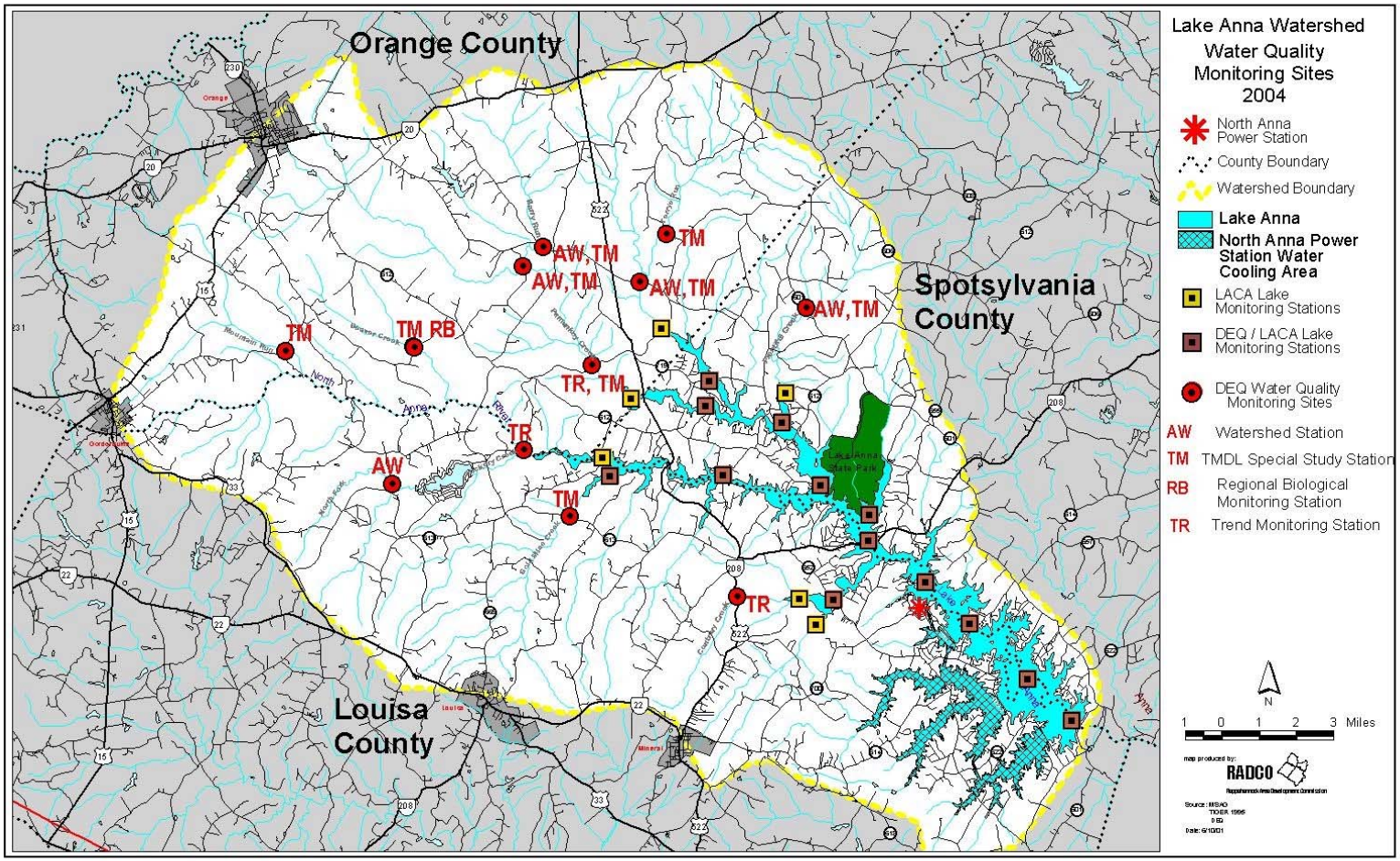



Figure 6. Lake Anna Watershed Water Quality Monitoring Sites, 2004

Water quality impaired waters in the watershed are indicated in DEQ's portrayal of its findings in 2003, shown below in Figure 7.

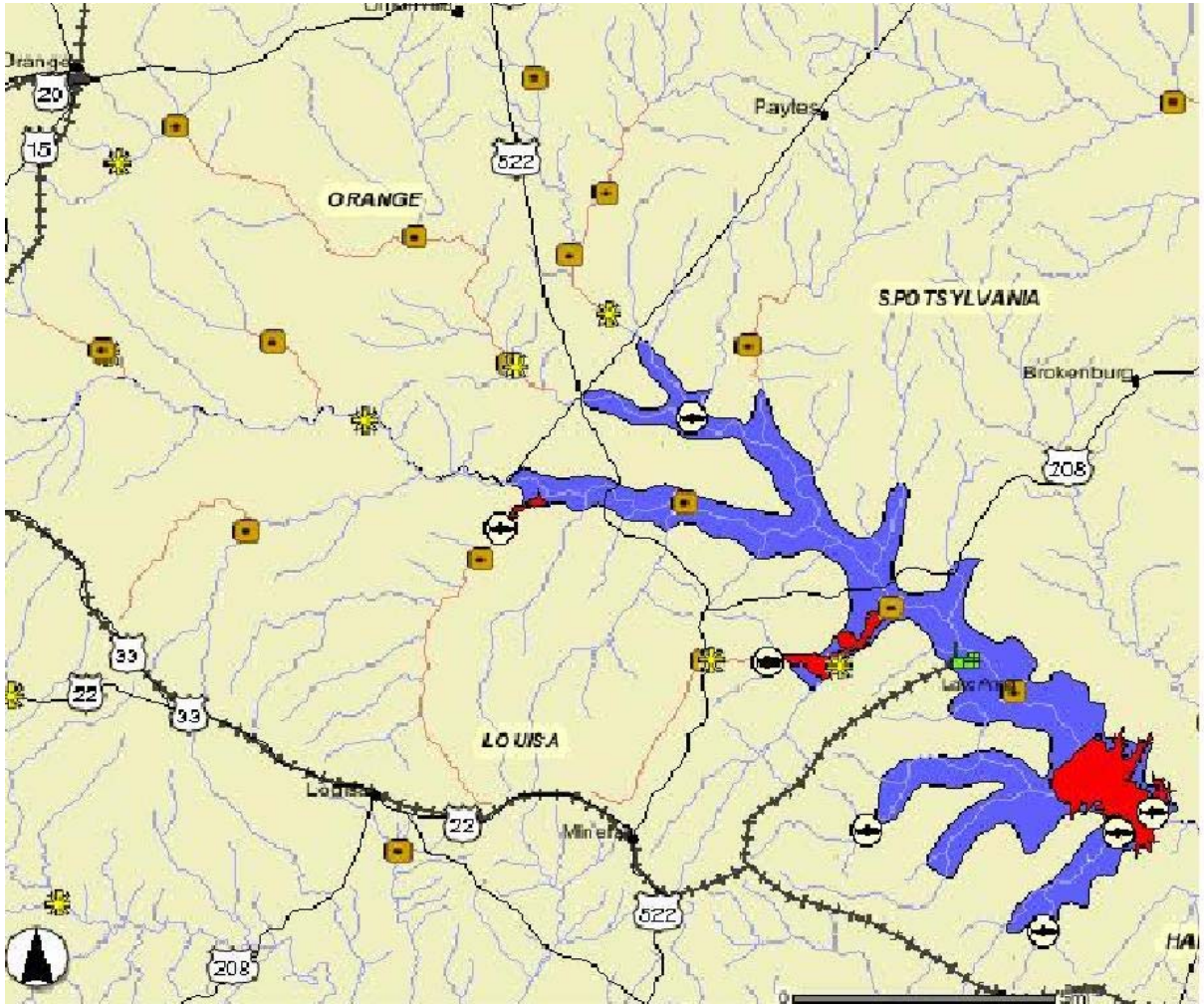



Figure 7. DEQ's Report of Impaired Waters, 2003

The streams colored red are impaired with bacteria, except for Contrary Creek which is impaired with acid runoff, as well as Goldmine Creek. These two creeks are located just west and east of the "LOUISA" county label on the southern part of the map. The red areas in the lake indicate PCB and metals impairments. Most recent studies of fish tissue indicate an additional PCB impaired area in Terry's Run at the fish symbol shown in the northernmost arm of the lake. The PCB assessment of Lake Anna now beginning by DEQ and the Corps of Engineers will give priority to focusing on such high-concentration areas.

The Lake Anna Civic Association (LACA) is sponsoring, with funding support from the National Fish and Wildlife Foundation, a thorough investigation during the summer of 2004 of watershed streams' ability to support aquatic life. This investigation, to be carried out by an intern from Randolph Macon College, will employ a technique of identifying water quality by examining the macroinvertebrate population of stream bottoms. This investigation will complement the regular physical, chemical and bacteriological monitoring conducted by DEQ and LACA volunteers by giving an aquatic life health profile of each stream over a period of years.

Imminent Total Maximum Daily Load (TMDL) investigations by DEQ of bacteria-impaired streams in the watershed will begin in the summer of 2004 and continue for several years. These TMDL investigations are mandated by state and federal law, and will result in local communities needing to take remedial action.

It is clear that the already extensive and growing monitoring activity will need careful management and coordination. LACA is currently playing that role, but it needs to be undertaken by a public agency with some authority to regularly marshal financial resources and implement county remediation activities. LAAC has chartered authority and membership needed to advise counties on such issues. LAAC could undertake this management role in cooperation with DEQ and LACA's monitoring programs.

## *RECOMMENDATIONS*

1. Watershed Management

1.1 The Lake Anna Advisory Committee (LAAC) should reaffirm the LASAP's principal recommendations, and undertake a phased program to obtain agreement from the watershed county governments to harmonize environmental and land use policies and ordinances.
1.2 LAAC should evaluate the desirability and feasibility of creating a Watershed Overlay District to more effectively manage watershed development, environmental resources, and land use practices.
1.3 LAAC should ask the soil and water conservation districts to guide county planning departments in tailoring environmental and land use policies and ordinances in accordance with best management practices.
1.4 LAAC should ask one of the planning district commissions to act as LAAC's agent to plan and harmonize the watershed tailoring effort, and to report on county performance in seeking harmonized policies and practices.
1.5 LAAC should ask the Virginia Farm Bureau to develop a watershed land conservation plan in cooperation with the county governments, aimed at maximizing farm and forest acreage for the future.
1.6 LAAC should promote and support use of the Lake Anna Watershed Roundtable as a broadly-based coalition of watershed stakeholders that can be useful for publicizing information and obtaining views on watershed issues.
1.7 LAAC should support and rely upon the Lake Anna Civic Association for water quality monitoring and coordination, land use analysis and information, and grant funding of watershed activities.

2. Harmonization of County Ordinances and Practices

2.1 County supervisors, executives and planners should structure their ordinances and land use policies so as to slow the rate of population growth in the Lake Anna watershed to no more than 2 percent per year.
2.2 County supervisors, executives and planners should improve their ordinances, policies and practices so as to raise their scores from those in Enclosure 2 by at least 20 percent per year to achieve and maintain a minimum score of 80 within four years.
2.3 Soil and water conservation districts should regularly advise their county supervisors, executives and planners on a comprehensive set of best management practices and policies to promote harmonization of county ordinances, policies and practices across the watershed. SWCDs should score their county ordinances annually.

3. Water Quality Management

3.1 LAAC, in cooperation with the county governments, should support water quality monitoring across the watershed with appropriate annual funding as requested by the Lake Anna Civic Association (LACA).
3.2 LACA should manage a water quality monitoring program of Lake Anna and its principal tributaries in cooperation with the Commonwealth's Departments of Environmental Quality (DEQ) and Conservation and Recreation (DCR), and Dominion Virginia Resources, Inc. LACA should request annual funding from LAAC and the county governments for this program.
3.3 LAAC should actively manage coordination of special monitoring, assessment and remediation activities for waters identified by state or federal environmental agencies as impaired.

4. Information Management

4.1 LAAC should initiate information programs to inform residents about water quality conditions and threats, and control options. In particular, lower uncertainty about options to help control water quality, particularly with respect to potential bacteria impairment and stormwater runoff.
4.2 LAAC should ask a Planning District Commission to plan and initiate an information program aimed at conserving lands in the watershed.
4.3 LACA should continue its initiative to have Mary Washington College's Environmental Sciences and Geology Department develop a GIS-based web site for public access through the internet to watershed information such as monitoring results and controlling environmental hazards.
4.4 LAAC should initiate a public information program aimed at publicizing the LASAP and recent watershed management issues. In particular, more public awareness is needed of the pros and cons of watershed overlay districts